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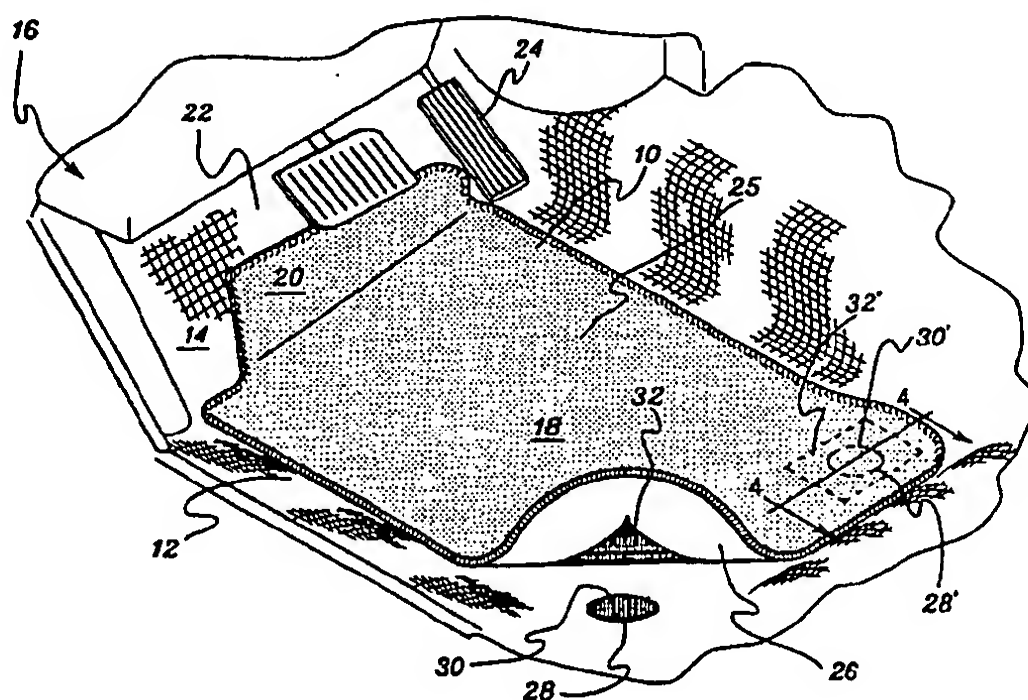
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(54) Title: AUTOMOTIVE FLOOR MAT RETENTION SYSTEM



(57) Abstract

An accessory floor mat (10) is retained in place on a carpet floor covering (12) in a floor well (14) of a motor vehicle (16), regardless of mat placement, by a hook and loop type fastener in which the hook portion (30) and loop portion (32) are of different sizes. A first, e.g. hook, portion (30) of the fastener is anchored on the carpet floor covering (12) while the second, e.g. loop, portion (32) is disposed on an underside (26) of the mat (10). The fastener portions are sized, constructed and located such that the smaller sized portion is immediately and substantially fully engaged with the other portion, regardless of mat placement, whenever the mat (10) is installed in the floor well (14). The first fastener portion (30) may be anchored on the carpet floor covering (12) with a clip (28) having a patterned central post (44). The second fastener portion (32) can be a textile fabric having elongated yarn loops (58) covering substantially all of the underside (26) of the mat (10). All components of the mat can comprise a material which is either inert or a member of a common chemical family to facilitate recycling of the mat.

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AUTOMOTIVE FLOOR MAT RETENTION SYSTEM

Background of the InventionField of the Invention

5 The present invention relates generally to accessory floor mats for use in automobiles and other motor vehicles, and, more particularly, to an improved retention system using hook and loop type fasteners for inhibiting movement of such mats on flooring of the vehicle.

10 Background Information

Floor mats of the "throw-in" or accessory type are widely used to protect the carpeted floor of automobiles and other motor vehicles. Such mats typically have a thin, planar form and are often made
15 of an elastomeric material sufficiently flexible to conform, in a general way, when placed in use, to the multiplicity of shapes and contours characteristic of today's automobile floors. Sometimes, a carpet layer is secured to the top of the elastomeric material.

20 A primary concern with respect to such automobile floor mats is their tendency to shift or move from their intended position in response to lateral forces experienced during occupant ingress, egress and in the course of normal driving
25 operations. This can result in the bunching, gathering and general disarray of the mat on the automobile floor; moreover, movement of the floor mat on the driver's side can present a significant safety hazard if the mat shifts so as to interfere with the
30 accelerometer, brake pedal or other automobile controls. Mat movement is, therefore, considered a serious and significant concern in relation to "throw-in" mats.

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To address this problem, attempts have been made in the past to increase the coefficient of friction between the mat and the supporting carpet floor covering of the automobile. Nibs or corrugations have been molded into the back of the elastomeric layer and/or an additional anti-skid layer, such as a polyurethane foam, has been laminated on the bottom of the elastomeric material. Others have attempted to increase the staying power of their mats by imbedding or securing rigidifying elements, e.g. rod-like elements or thin, flat sheets, to the flexible elastomeric mat. Still other prior art efforts to reduce mat slippage have employed mechanical retaining means to fasten the accessory mat to the underlying carpeted surface. Unfortunately, surveys reveal that vehicle owners often fail to use such mechanical fasteners.

Another known approach employs hook and loop type fasteners to secure a mat in a particular location on an underlying carpet surface. U.S. Patent 4,810,024 describes a shoe guard mat which is fastened to an underlying carpet with two interlocking strip fasteners. More particularly, one side, such as the "hook" side of two adhesive backed VELCRO strips (VELCRO is a registered trademark of Velcro U.S.A., Inc.) are adhesively secured to a rear surface of the mat. The mating portions (the "loop" side) of the two adhesive backed VELCRO strips are adhesively secured at appropriate locations on the top surface of the underlying carpet. The use of these strips purportedly permits the shoe guard mat to be easily removed for cleaning and then "accurately re-positioned back into its original location on the carpeted mat."

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U.S. Patent No. 5,003,664 describes another hook and loop type fastening system for an automobile floor mat. A portion, e.g. the loop portion, of each of a set of four fasteners is secured to the underside of the mat, near each corner, by stitching or a suitable adhesive. The mating, e.g. hook, portion of each fastener is secured to the top face of a main portion of a corresponding stainless steel clip. Each clip has a dependent, spaced apart, spike portion extending parallel to and beyond the perimeter of the main clip portion. The spike portion penetrates, underlies and pinches the floor carpet. The clips are inserted in the floor carpet so that the hook and loop portions of each fastener align. In use, a clip located near a particular corner of the mat resists forces having a component extending in the direction of the clip's spike and the four clips thus cooperate to prevent mat shifting in any direction.

These earlier hook and loop type fastening systems for automobile accessory floor mats suffer from a number of shortcomings, and have not been widely adopted. One of the more serious shortcomings of both of these approaches is the requirement to precisely reposition the mat so that the mating portions of each hook and loop type fastener are aligned. Correct alignment can be difficult to achieve because of the location of the fastener portions on the underside of the mat and requires a concerted effort on the part of the user.

Misalignment diminishes and may totally defeat the mat retention function of the fasteners. Another drawback is the need for exact registration in initially locating the corresponding portions of the fasteners secured to the underlying carpet and the

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underside of the floor mat. The fastener portions on the back of the mat may also detract from the aesthetic appearance of the mat. Further, the spiked clip may pose a safety risk to the user, requires
5 lamination of the hook portion to the clip in the clip fabrication process, and mandates the use of multiple clips to prevent mat movement in all directions.

A need thus persists for a hook and loop type
10 fastening system for inhibiting slippage of an accessory floor mat on a carpet floor covering or other flooring of a vehicle regardless of the placement of the mat in the floor area, and which overcomes the other drawbacks of the earlier systems.

15 Summary of the Invention

The present invention answers this need and affords additional benefits by providing a hook and loop type fastening system for an accessory floor mat in which the hook and loop portions of the fastener
20 always engage regardless of mat placement. A first portion of a hook and loop type fastener is adapted to be anchored on the flooring at a selected location within the floor area of a vehicle. The first portion has an exposed surface of a first size. A
25 second portion of the hook and loop type fastener is located on an underside of the accessory floor mat. The second portion has an exposed surface area of a second size different than said first size. The first and second portions are designed to accommodate
30 repeated engagement and peel-apart disengagement cycles and are sized, constructed and located such that a smaller sized one of the portions is immediately and substantially fully engaged with the other portion, regardless of mat placement, whenever

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the first portion is anchored at the selected location in the floor area and the mat is placed on the flooring in the floor area.

In a presently preferred embodiment, the first portion adapted to be anchored on the flooring comprises the hook portion and is smaller in size than the loop portion on the underside of the mat. The hook portion is preferably anchored on the flooring with a clip having anchoring means that resists lateral forces exerted on the clip in any direction. The anchoring means may comprise a protruding post. The outer surface of the post is patterned to anchor the clip on the flooring. The pattern may take the form of an auger type screw, a fishbone, a bayonet, or other design. Optimally, the hook portion and clip are of a one-piece molded construction, avoiding both the need for a separate lamination step in the clip fabrication process and the possibility of delamination during use. A groove may be formed in the top surface of the clip and contoured to receive the edge of a coin or the end of a tool, such as a screwdriver, in order to facilitate easy installation and removal of the clip. Multiple clips each having a hook portion which always substantially fully engages a loop portion on the underside of the accessory floor mat can be advantageously employed, without requiring either initial exacting registration of fastener portions or subsequent precise mat placement.

In another aspect, the loop portion advantageously comprises a textile fabric having elongated yarn loops extending outwardly from the underside of the mat. Preferably, the textile fabric covers substantially all of the underside of the floor mat providing an aesthetically attractive

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surface on a conveniently fabricated mat. A face layer, e.g. a face carpet, of the mat may be secured to the textile fabric with a bonding agent. When each component of the floor mat is made of a material which is either inert or a member of a common chemical family, the floor mat can be recycled without separating components thereof. The common chemical family may comprise olefins and the textile fabric may comprise a knitted polypropylene fabric having multifilament yarn loops.

A major advantage of the mat retention system of the present invention is that it secures an accessory floor mat in place regardless of whether the mat is properly positioned in the floor area or not. No alignment or other active intervention by the user is required. The random placement feature of a "throw-in" mat is thus retained while passively and perennially overcoming the mat slippage problem. The positive and persistent retention provided by the improved hook and loop type fastening system of the present invention permits a significant reduction in the weight of the accessory floor mat. A lighter weight and attractively appearing floor mat which can be economically manufactured and fully recycled results. The anchoring clips, in their many variant forms, are strong, durable, safe, lightweight, economical to manufacture, easy to install or remove, and omnidirectional in their resistance to lateral forces. Taken together, these attributes define a floor mat retention system surpassing those which were previously available.

These and other aspects, features and benefits of the present invention will be more fully understood from the following detailed description of

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preferred embodiments, when read in conjunction with the accompanying drawings.

Brief Description of the Drawings

FIG. 1 is a perspective view illustrating, in accordance with the principles of the present invention, a first embodiment of an accessory floor mat, and a first embodiment of an anchoring clip disposed on a carpet floor covering in a floor well area of a vehicle, with one corner of the mat folded over to reveal the relationship between portions of a hook and loop type fastener;

FIG. 2 is a side elevational view of a first embodiment of an anchoring clip of the present invention;

FIG. 3 is a top plan view of the anchoring clip of FIG. 2;

FIG. 4 is a sectional view taken along line 4-4 in FIG. 1;

FIG. 5 is a perspective view of the top side of an alternate embodiment of an accessory floor mat constructed according to the principles of the present invention;

FIG. 6 is a perspective view of the underside of the accessory floor mat of FIG. 5;

FIG. 7 is a cross-sectional view taken along line 7-7 of FIG. 5;

FIG. 8A is a front elevational view of an alternate embodiment of an anchoring clip having a bayonet type end pattern;

FIG. 8B is a side elevational view of the anchoring clip of FIG. 8A;

FIG. 9A is a front elevational view of another alternate embodiment of an anchoring clip having a fishbone pattern; and

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FIG. 9B is a partial sectional side view of the anchoring clip of FIG. 9A.

Detailed Description

Referring now to the drawing figures, in which
5 like elements are identified by like reference
numbers, FIG. 1 depicts an accessory floor mat 10
disposed upon a carpet floor covering 12 within a
floor well area 14 of an automobile or other motor
vehicle 16. Mat 10 is typically of a thin, flat,
10 flexible construction. For the driver's side of a
vehicle, the mat typically has a main body portion 18
designed to rest on the generally flat floor portion
of the floor well and a front body portion 20 which
overlies the inclined front firewall 22 of floor well
15 14. The shape of mat 10 reflects the contours of the
floor well and accommodates vehicle controls such as
accelerator pedal 24.

Mats designed for the passenger side of a
vehicle or the foot area of the back seats are often
20 simpler in shape. The configuration of the mat will
also depend upon whether it is intended for generic
use or is custom designed for a particular vehicle
series or model. Original equipment mats are often
custom designed while aftermarket mats are frequently
25 intended for use in a wider variety of vehicles. The
principles of the present invention are applicable to
all such mats, as well as to mats designed to overlie
the flooring (i.e. base floor or floor covering of
carpet, vinyl, rubber, etc.) in other floor areas
30 such as the trunk or cargo surface area of a vehicle.

Returning to FIG. 1, mat 10 has an exposed top
surface 25, preferably consisting of a face carpet,
as more fully described hereinafter. On the

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underside of mat 10 is a downwardly facing surface 26 which contacts underlying carpet floor covering 12.

Anchored on carpet floor covering 12, at a selected location within floor well 14, is an anchoring clip 28. A first, e.g. hook, portion 30 of a hook and loop type fastener is disposed on a top surface of clip 28. The first portion has an exposed surface area of a first size. A second, e.g. loop, portion 32 of the hook and loop type fastener is on the underside surface 26 of mat 10. The second portion 32 has an exposed surface area of a second size different than, and preferably larger than that of the first portion 30 on clip 28. The first and second portions of the fastener are designed to interlock, in known fashion, when the two portions are brought into contact. The hook and loop portions of the fastener resist shear force separation while accommodating repeated engagement and peel apart disengagement cycles.

Unlike prior art hook and loop type fasteners used for floor mats, first portion 30 and second portion 32 are not matched in size. Rather, second portion 32 is substantially larger in size than first portion 30. For example, the second portion may extend over an area 4 inches by 4 inches while the first portion has a circular shape with a diameter of less than 2 inches. Preferably, as more fully described hereinafter with regard to FIG. 6, the second portion covers substantially all of the underside of the mat. This size difference is designed to ensure that the smaller sized one of the first and second portions is substantially fully engaged with the other one of said portions, regardless of mat placement, whenever the first portion 30 is anchored at the selected location and

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the mat 10 is installed on the carpet floor covering 12 in the floor well 14. Accordingly, mat 10 is always securely retained in place regardless of the care, or lack thereof, with which it is placed in the floor well. Skew, or lateral or longitudinal misalignment of the mat does not adversely affect the retention power of the hook and loop type fastener of the present invention. Mat shifting is prevented regardless of mat placement.

As shown in FIG. 1, a second anchoring clip 28', with a first portion 30' of the hook and loop type fastener atop thereof, can be anchored on the carpet floor covering 12 in the right, rearward portion of floor well 14. First portion 30' is designed to always engage an oversized mating second portion 32' on the underside of mat 10. The pair of fasteners formed by portions 30 and 32, and 30' and 32', serve to lock mat 10 in place while affording leeway with respect to the placement of the mat in the floor well. The shape, dimensions, location and construction of the fastener portions, and the number of fasteners may vary from that shown in FIG. 1 so long as the placement independent retention function of the invention is preserved.

The hook and loop type fastener used to restrain movement of the accessory floor mat in accordance with the principles of the present invention, should ensure substantial resistance to mat movement due to exertion of lateral forces (shear strength), while simultaneously permitting easy removal of the floor mat for cleaning and other purposes (peel strength). These properties should persist through recurrent removal, cleaning and reinstallation cycles of the mat. The art of hook and loop type fasteners is well developed, and any construction which satisfies the

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above specification may be used in the present invention. Hook and loop type fasteners are known and available from various commercial organizations such as VELCRO USA, Inc. of Manchester, Vermont.

5 A first embodiment 28a of anchoring clip 28 is shown in Figures 2-4. Anchoring clip 28a includes a flat disc shaped member 34 having a top surface 36 and a bottom surface 38. Hook portion 30 of the hook and loop type fastener is disposed on top surface 36
10 of member 34. Hook portion 30 typically includes many parallel rows of miniature hook elements. The hook elements are typically produced from a synthetic material such as nylon, molded to shape, and arranged such that hook elements in alternating rows face in
15 opposite directions. The hook elements may be unidirectional or multidirectional and can have a typical height on the order of 0.035 inches and a typical density of 750 hooks per square inch. One suitable hook material is designated as the HTH #15
20 Hook available from VELCRO USA, Inc.. A complementary loop material available for the loop portion of the fastener, also available from VELCRO USA, Inc., is designated as LOOP #2000.

Hook portion 30 preferably covers substantially
25 all of the top surface 36 except for a central band or location where a groove 40 is provided. Groove 40 extends from top surface 36 partially into member 34 and has a curved lower surface 42 (shown in phantom). The groove is dimensioned and contoured so as to
30 receive the edge of a coin therein. The inserted coin (not shown) facilitates rotation of clip 28a about a central longitudinal axis A-A. The groove, or other recess formed in the top surface of member 34 can extend partially or fully along a diameter of
35 member 34 or can be otherwise sized and shaped, e.g.

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to accept and be engaged by the end of a tool, such as the head of a screwdriver, for the same purpose.

5 A post 44 extends from a central location on the bottom side 38 of member 34 along axis A-A. The outer surface of post 44 is provided with an auger type screw pattern 46 so that the anchoring clip may be firmly screwed into the scrim and backing layer 54 of carpet floor covering 12. When so anchored, clip 28a equally resists lateral forces applied in any direction. Reverse rotation allows for unscrewing and removal of clip 28a if desired. Preferably, clip 28a, including hook portion 30, is of a molded one piece plastic construction. The hook portion is thus integral with the anchoring portion of the clip, eliminating the need for any special lamination step in the clip fabrication process. Alternatively, hook portion 30 may be adhesively or otherwise permanently bonded to the top surface of member 34.

20 Other variations in the form of the anchoring section of the anchoring clip are shown in Figures 8A and 8B, and 9A and 9B. Clip 28b of FIGS. 8A and 8B is similar to previously described clip 28a, except that instead of an auger type screw pattern, post 44b is provided with a bayonet type end piece 48 at its remote end. The bayonet type end piece is designed to fit within a complementary opening in a known receptacle (not shown) secured to carpet floor covering. Quarter turn rotation of clip 28b causes the bayonet type end portion 48 to engage detents in the receptacle and thereby become firmly fastened thereto. Depression and reverse rotation frees clip 28b from the receptacle.

30 Anchoring clip 28c of FIGS. 9A and 9B is provided with a fishbone pattern 50 along two opposed side edges of post 44c and back to back axially

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extending slots 52 between the fishbone patterned side edges. The fishbone patterned post 44c of clip 28c is designed to engage a complementary known receptacle (not shown) secured to carpet floor covering 12 so that rotation of the clip a quarter turn in one direction locks the clip to the receptacle while another quarter turn rotation frees the clip.

The alternate embodiments of anchoring clip 28 shown in FIGS. 8A, 8B, 9A and 9B preferably also include a central groove 40 to facilitate clip rotation and, optimally, are fabricated as a single piece molded construction, including hook portion 30. All embodiments are omnidirectional in their resistance to lateral displacement forces. The post extending from the underside of the anchoring clip may be offset from the center, and variations in the configuration and patterning of the outer surface of the post are also possible. The anchoring clip may take many other forms, including a bracket secured to a seat rail or other floor mounted structure, so long as it firmly anchors first portion 30 of the hook and loop type fastener on the flooring.

In use, an anchoring clip 28 is firmly secured on the flooring, e.g. the carpet covering the vehicle floor. In FIG. 4, for example, clip 28a is screwed into the scrim or backing layer 54 compressing the sandwiched carpet fibers 56a of carpet floor covering 12. Preferably, when clip 28a is screwed in and thus anchored to the carpet floor covering 12, hook portion 30 is at the same height as, or slightly below the top of carpet fibers 56.

Referring still to FIG. 4, oversized loop portion 32 is secured on the underside 26 of accessory floor mat 10. Loop portion 32 includes

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elongated loops 58 supported by and extending downwardly from a backing material 60. Loop portion 32 can be constructed by use of weaving or knitting technologies. Yarns used to form loops 58 can be produced from a variety of materials including nylon, polyester, polypropylene, or a combination thereof, etc., and in any suitable denier. The loops can be napped or unnapped. Napped loops typically allow for greater hook engagement opportunities. The dispersion of the loops can be random or uniform; preferably, multifilament yarns form the loops. An exemplary material for loop portion 32 is sold under the brand name LOOP 2000 by VELCRO USA, Inc. and consists of a woven nylon unnapped loop tape.

Loop portion 32 may be provided with a binder coat, e.g. latex or ethylene vinyl acetate, to lock individual loops 58 into backing material 60. Loop portion 32 can be bonded to the underside of mat 10 with a precoat or layer of suitable adhesive 61. Alternatively, the loop portion may be welded, molded, laminated or otherwise firmly secured to the underside of mat 10. If desired, the loop portion can be countersunk or otherwise embedded in the underside of the accessory floor mat.

To ensure fastener engagement independent of mat placement, loop portion 32 is oversized in relation to hook portion 30. The loop portion may take the form of multiple pads as shown in FIG. 1 or a single pad covering an extended section or substantially all of the underside of the accessory floor mat. The size and location of the pad(s) are determined in relationship to the size and location of the anchored hook portion(s) and the placement leeway of the accessory floor mat within the floor area.

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FIGS. 5-7 illustrate an alternate embodiment of a custom design accessory floor mat 10' having a loop portion 32' covering substantially all of the underside of the mat. As shown in FIG. 5, mat 10' has a main body portion 18' to protect the floor portion of a floor well and a narrower, generally shorter front portion 20' which overlies a front firewall of the vehicle. The outline of the mat is determined primarily by the contours of the floor well. The top surface 25' of the mat consists of a face carpet 62 everywhere except at optional inset area 64 and along the periphery of the mat.

The inset area 64 can be used to display indicia, such as a logo or designation of the vehicle brand, e.g. on a recessed embroidered fabric, or otherwise. The periphery of mat 10' is preferably finished with trim 66, e.g. by yarn serging or in other known fashion.

Face carpet 62 can be woven, knitted, tufted, needle punched or otherwise constructed. The face carpet can be produced from any textile fiber, e.g. nylon, polyester, polypropylene, etc., and in any construction pattern, gauge, stitches/inch, etc. suitable for application in an automotive accessory floor mat. A heel pad (not shown) may be disposed on face carpet 62, in well known fashion, if desired. Instead of a face carpet, a face layer of other material may also be used.

As best seen in the view of FIG. 6 in which mat 10' is shown turned upside down, substantially all of the underside 26' of mat 10' is covered with loop portion 32'. An optional inset area 68 can be reserved for additional information or indicia such as a part number. Edge finishing trim 66 also

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extends along the periphery of the underside of the mat.

Turning now to FIG. 7, loop portion 32' comprises a textile fabric having elongated
5 multifilament yarn loops 58' extending outwardly from a fabric backing material 60'. Loop portion 32' preferably consists of a lightweight engineered textile fabric knitted or woven in a dimensionally stable construction. Yarn loops 58' can be produced
10 from such material as nylon, polyester, polypropylene, or a combination thereof, etc., in any suitable denier. The fabric can be napped or unnapped. A lightweight (7.5 oz./sq. yd.) napped, circular knit textile fabric of a Terry knit
15 construction having multifilament loop yarns with a denier range between 150 and 210 and produced from polypropylene, is presently preferred.

The textile fabric loop portion 32' on the underside of the mat is secured to face carpet 62 on
20 the top surface of the mat with an appropriate bonding agent 70. The bonding agent should be compatible for adhesion to both textile fabric loop portion 32' and face carpet 62, as well as suitable for automotive environment conditions, e.g. wide
25 temperature fluctuations. Preferably, the bonding agent 70 also provides a vapor barrier within the mat.

The underside of face carpet 62 may have a binding precoat (not shown) of, for example, latex
30 and/or EVA (ethylene vinyl acetate) to lock carpet tufts 72 into the scrim or primary backing 74 of face carpet 62. Textile fabric loop portion 32' may have a similar binding precoat in order to lock individual loops 58' into backing material 60'. A layer of TPO
35 (thermoplastic olefin) can serve as the bonding agent

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(and moisture barrier) 70 between the precoated face carpet 62 and precoated textile fabric loop component 32'.

5 Preferably the face carpet 62, textile fabric loop portion 32', bonding agent 70 and peripheral trim 66 are each comprised of a material from a common chemical family. The olefin family is preferred because of its low moisture retention and low specific gravity. A floor mat in which all
10 components are comprised of either a material from a common chemical family, e.g. olefins, or an inert material, e.g. latex, has the additional major advantage of being recyclable, for example, into feedstock for mat TPO, without requiring separation
15 of the components. (To further enhance product recyclability, anchoring clip 28 can also be made of a material from the same chemical family, e.g. polypropylene of the olefin family.)

20 The textile fabric loop portion 32' should be able to withstand many repeated engagement and peel apart disengagement cycles over the anticipated life cycle of the mat.

The shape of mat 10', the indicia in inset 64 and the location of any heel pad provide indications
25 of the proper general orientation of the mat within the floor well. The use of the textile fabric loop portion throughout substantially all of the underside of the mat assures positive retention of the mat in place, regardless of the particular placement of the
30 mat within the floor well. The textile fabric loop portion 32' also provides a highly attractive backing which can be color matched to the floor mat, all at a reasonable manufacturing cost. Mat 10' can be of significantly lighter weight than existing mats
35 because of the positive retention system of the

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present invention while still having an appropriate "hand" (i.e. solid feel). The reduction in mat weight affords savings in fabrication material, shipping costs, and vehicle fuel economy.

5 In summary, the retention system of the present invention provides an improved solution to the mat slippage problem. An accessory floor mat is immediately, automatically and firmly secured in place, regardless of mat placement within the floor
10 well. Mat slippage is avoided without requiring precise mat alignment upon installation. The "throw-in" attribute of an accessory floor mat is thereby preserved, without sacrificing safety. Furthermore, a highly attractive, textile backed, lighter weight,
15 recyclable accessory floor mat can be used in the mat retention system of the present invention, affording many additional appreciable benefits.

Although specific embodiments of the invention have been described and depicted herein, those
20 skilled in the art will recognize that numerous variations, modifications, substitutions and the like can be made without departing from the spirit of the invention. For example, the locations of the hook and loop portions of a fastener can be interchanged.
25 The hook and loop fasteners can be supplemented with nibs or other auxiliary mat retention devices. The first fastener portion can be anchored directly to the carpet floor covering or other flooring rather than with a clip. The accessory floor mat can take
30 different constructions and shapes, and may be molded, vacuum formed or otherwise fabricated. These and other variations are all intended to be encompassed by the accompanying claims.

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What is claimed is:

1. A passive floor mat retention system for inhibiting slippage of an accessory floor mat (10) on flooring (12) in a floor area (14) of an automobile or other motor vehicle (16), comprising:

- 5 a first portion (30) of a hook and loop type fastener adapted to be anchored on the flooring (12) at a selected location within the floor area (14), said first portion (30) having an exposed surface area of a first size; and
- 10 an accessory floor mat (10) having a second portion (32) of the hook and loop type fastener on an underside (26) of the mat, said second portion (32) having an exposed surface area of a second size different than said first size, said
- 15 first and second portions accommodating repeated engagement and peel apart disengagement cycles and being sized, constructed and located such that a smaller sized one of the first and second portions is immediately and substantially fully
- 20 engaged with the other one of said portions, regardless of mat placement, whenever the first portion (30) is anchored at said selected location and the mat (10) is placed on the flooring (12) in the floor area (14).

2. The passive floor mat retention system of claim 1 wherein said first portion (30) comprises the smaller sized one of said first and second portions.

3. The passive floor mat retention system of claim 2 wherein said first portion (30) comprises a hook portion, and said second portion (32) comprises a loop portion of the hook and loop type fastener.

4. The passive floor mat retention system of claim 3 wherein said hook portion (30) is adapted to be anchored on the flooring (12) with a clip (28),

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and said hook portion (30) and clip (28) together
5 comprise a one piece molded construction.

5. The passive floor mat retention system of
claim 3 wherein said hook portion (30) is adapted to
be anchored on the flooring with a clip (28) having a
central post (44) extending away from said hook
5 portion.

6. The passive floor mat retention system of
claim 5 wherein said post (44) includes an auger type
screw (46) for screwing the clip into the flooring
(12).

7. The passive floor mat retention system of
claim 5 wherein said post (44) includes a bayonet
type end piece (48) for locking engagement with a
receptacle mounted to the flooring.

8. The passive floor mat retention system of
claim 3 wherein said floor area (14) comprises a
floor well and said flooring (12) comprises a carpet
floor covering, and further comprising at least two
5 hook portions (30, 30') each having an exposed
surface area of said first size, said two hook
portions being anchored on the carpet floor covering
at spaced apart rearward locations within the floor
well, and wherein each of said two hook portions is
10 substantially fully engaged with the loop portion
(32, 32') on the underside of the mat, regardless of
mat placement, when the mat is installed on the
carpet floor covering in the floor well.

9. The passive floor mat retention system of
claim 3 wherein said loop portion (32) comprises a
textile fabric having elongated yarn loops (58)
extending outwardly from the underside (26) of the
5 mat (10).

10. The passive floor mat retention system of
claim 9, wherein said textile fabric covers

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substantially all of the underside (26') of the floor mat (10').

11. The passive floor mat retention system of claim 10 wherein said floor mat (10') further comprises a face carpet (62) secured with a bonding agent (70) to said textile fabric (32').

12. The passive floor mat retention system of claim 11 wherein the face carpet (62), bonding agent (70), and textile fabric are each composed of a material from a common chemical family.

13. The passive floor mat retention system of claim 12 wherein each component of the floor mat comprises a material which is one of (a) inert and (b) from said common chemical family, whereby the
5 floor mat can be recycled without separating components thereof.

14. The passive floor mat retention system of claim 13 wherein said common chemical family comprises:
olefins.

15. The passive floor mat retention system of claim 14 wherein said textile fabric (32') comprises a knitted polypropylene fabric.

16. The passive floor mat retention system of claim 3, wherein said loop portion (32) is welded on the underside (26) of the mat (10).

17. The passive floor mat retention system of claim 1, wherein said first portion (30) comprises the smaller sized one of said first and second portions, said first portion (30) comprises a hook
5 portion and said second portion (32) comprises a loop portion of the hook and loop type fastener, said hook portion is adapted to be anchored on the flooring with a clip (28), said hook portion and clip together comprise a one piece molded construction, said loop

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10 portion comprises a textile fabric (32') which covers substantially all of the underside (26') of the mat, and each component of the floor mat comprises a material which is one of (a) inert and (b) a member of a common chemical family.

18. The passive floor mat retention system of claim 17 wherein said common chemical family comprises olefins.

19. The passive floor mat retention system of claim 18, wherein said textile fabric comprises a knitted polypropylene fabric, and said hook portion (30) and clip (28) are comprised of polypropylene.

5 20. An automotive accessory floor mat (10) comprising:

a face layer (62) on an upper surface (25) of the mat (10);

10 a textile fabric (32') covering substantially all of an underside (26') of the mat, said textile fabric having elongated yarn loops (58') extending outwardly from the underside of the mat, said loops being adapted for repeated engagement and peel apart
15 disengagement with a hook portion (30) of a hook and loop type fastener; and

a bonding agent (70) securing the face layer to the textile fabric.

20 21. The automotive accessory floor mat of claim 20 wherein said face layer (62), textile fabric (32'), and bonding agent (70) are each comprised of a material from a common chemical family.

22. The automotive accessory floor mat of claim 21 wherein said common chemical family comprises olefins.

23. The automotive accessory floor mat of claim 22 wherein said face layer (62) comprises face

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carpet, and further including peripheral trim (66) extending around a periphery of the mat and covering edge portions of said face carpet, and textile fabric.

24. The automotive accessory floor mat of claim 23 wherein all components of the mat are comprised of one of (a) an inert material and (b) a material from said common chemical family, whereby the floor mat can be recycled without separation of said components.

25. The automotive accessory floor mat of claim 20 wherein said textile fabric (32) comprises multifilament yarn loops of polypropylene.

26. A clip (28) for use in a passive floor mat retention system for inhibiting slippage of an accessory floor mat (10) on flooring (12) in a floor area (14) of an automobile or other motor vehicle (16), the clip (28) comprising:

a first member (34) having a top surface (36) and a bottom surface (38);

a first portion (30) of a hook and loop type fastener on said top surface (36) for immediately engaging a second portion (32) of the fastener on an underside (26) of the mat (10) as the mat is placed on said flooring (12); and

anchoring means for anchoring the clip (28) on the flooring (12) in a selected location in the floor area (14) such that lateral forces exerted on the clip (28) in any direction are resisted.

27. The clip (28) of claim 26 wherein said anchoring means comprises a post (44) extending from a first location on the bottom surface (38) of the first member (34) to a remote end, said post (44) being

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5 configured to anchor the clip (28) on the flooring (12) such that lateral forces exerted on the clip (28) in any direction are resisted.

28. The clip (28) of claim 27 being entirely of a molded one-piece construction.

29. The clip (28) of claim 28 wherein said first portion comprises a hook portion (30) of the hook and loop type fastener, and wherein said first member (34), hook portion (30) and post (44) are all
5 made of a plastic material.

30. The clip (28) of claim 27 further comprising a groove (40) formed in the first member (34) at a location on the top surface (36) thereof opposite said first location.

31. The clip (28) of claim 30 wherein the groove (40) has a curved bottom surface (42) to receive the edge of a coin therein.

32. The clip (28) of claim 30 wherein the groove (40) is configured to receive and be engaged by the end of a tool.

33. The clip (28) of claim 27 wherein the post (44) extends orthogonally from a central location on the bottom surface (38) of the first member (34) and has an outer surface patterned to anchor the clip (28) on the flooring (12).
5

34. The clip (28) of claim 33 wherein the outer surface of the post (44) has an auger type screw pattern (46).

35. The clip (28) of claim 33 wherein the outer surface of the post (44) has a fishbone pattern (50).

36. The clip (28) of claim 33 wherein the post (44) has a bayonet type end piece (48) at its remote end.

37. The clip (28) of claim 33 further comprising a groove (40) formed in the first member

-25-

(34) at a central location on the top surface (36)
thereof, and wherein the clip (28) is comprised
5 entirely of a molded one piece construction.

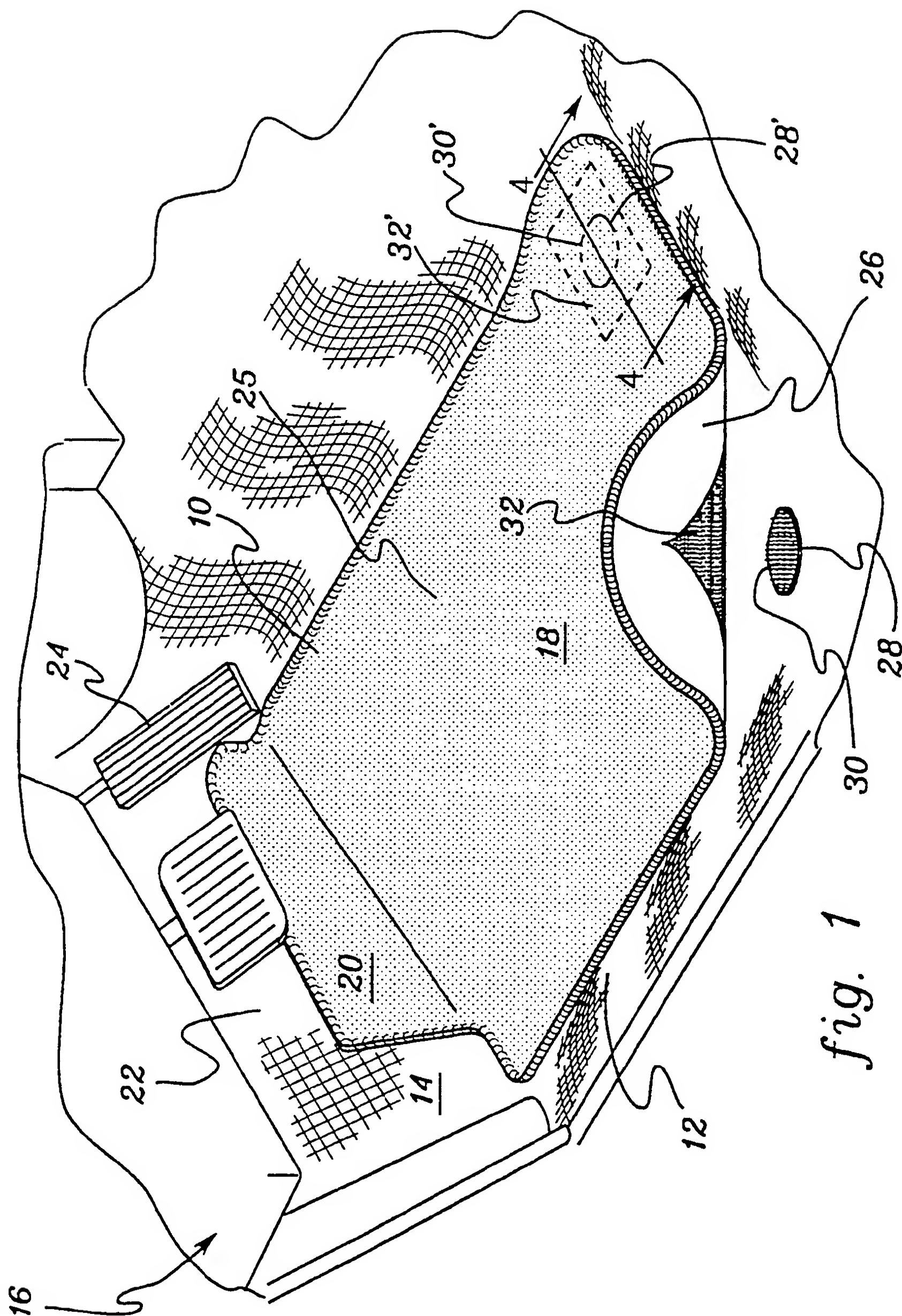


fig. 1

fig. 2

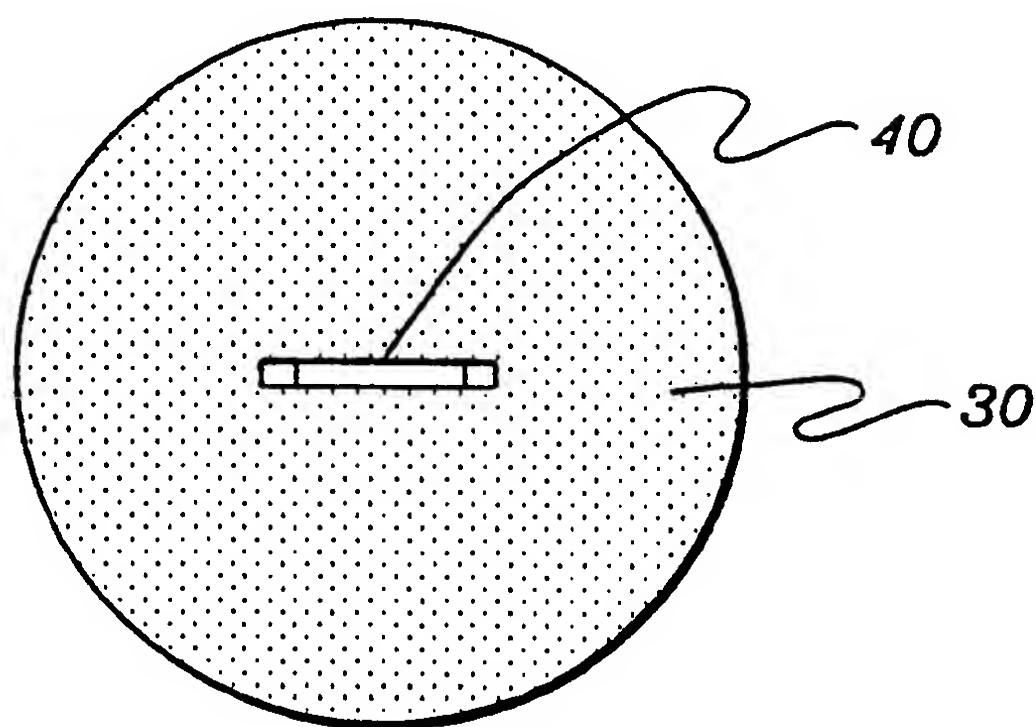
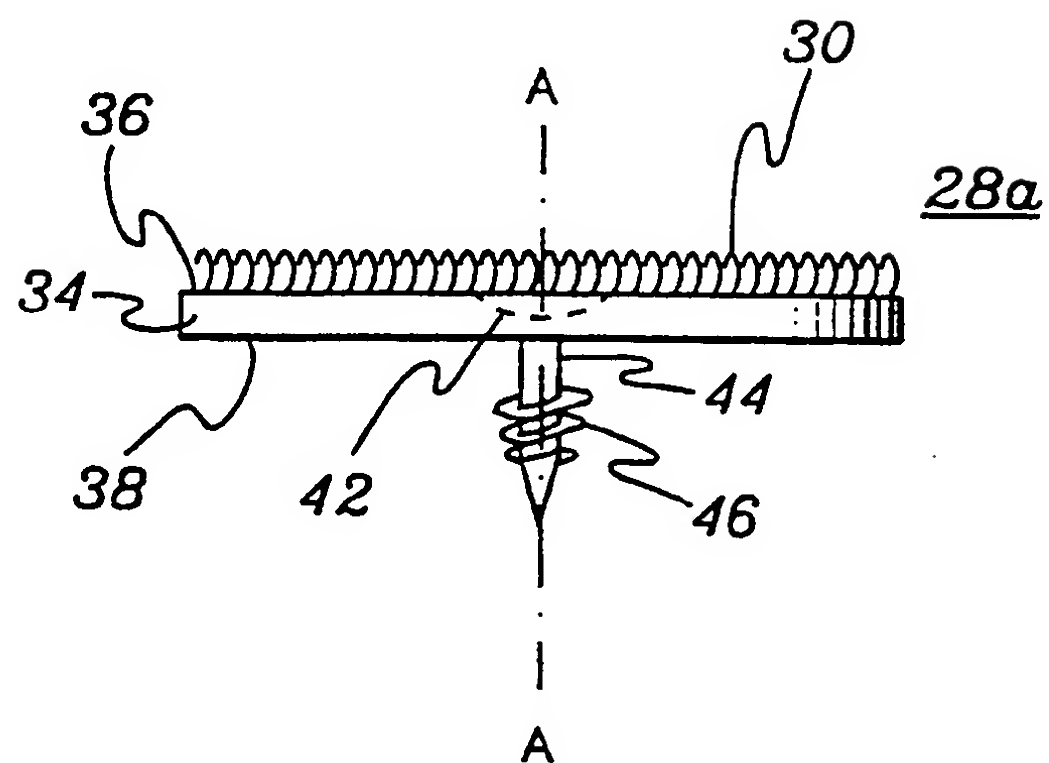


fig. 3

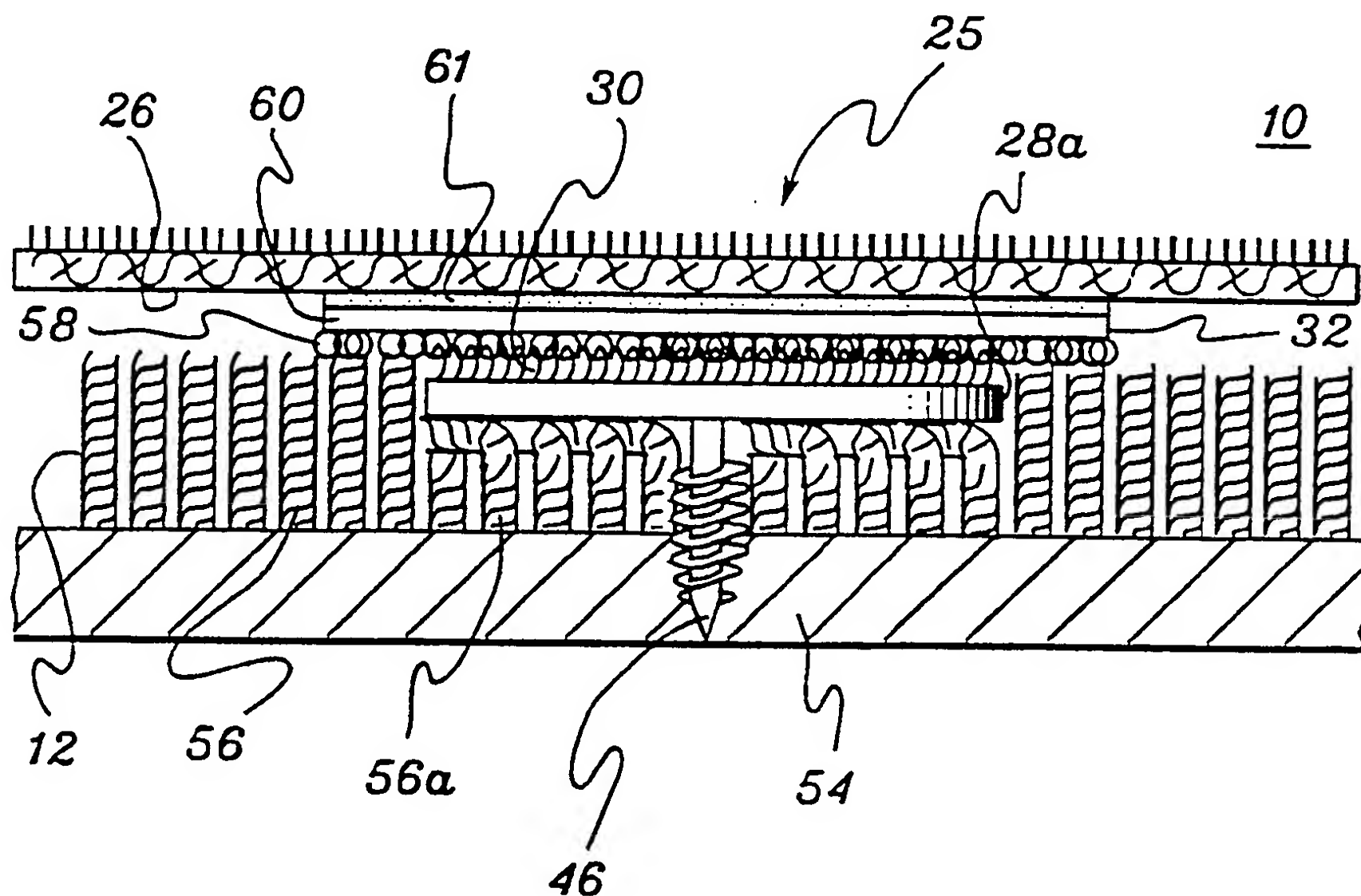


fig. 4

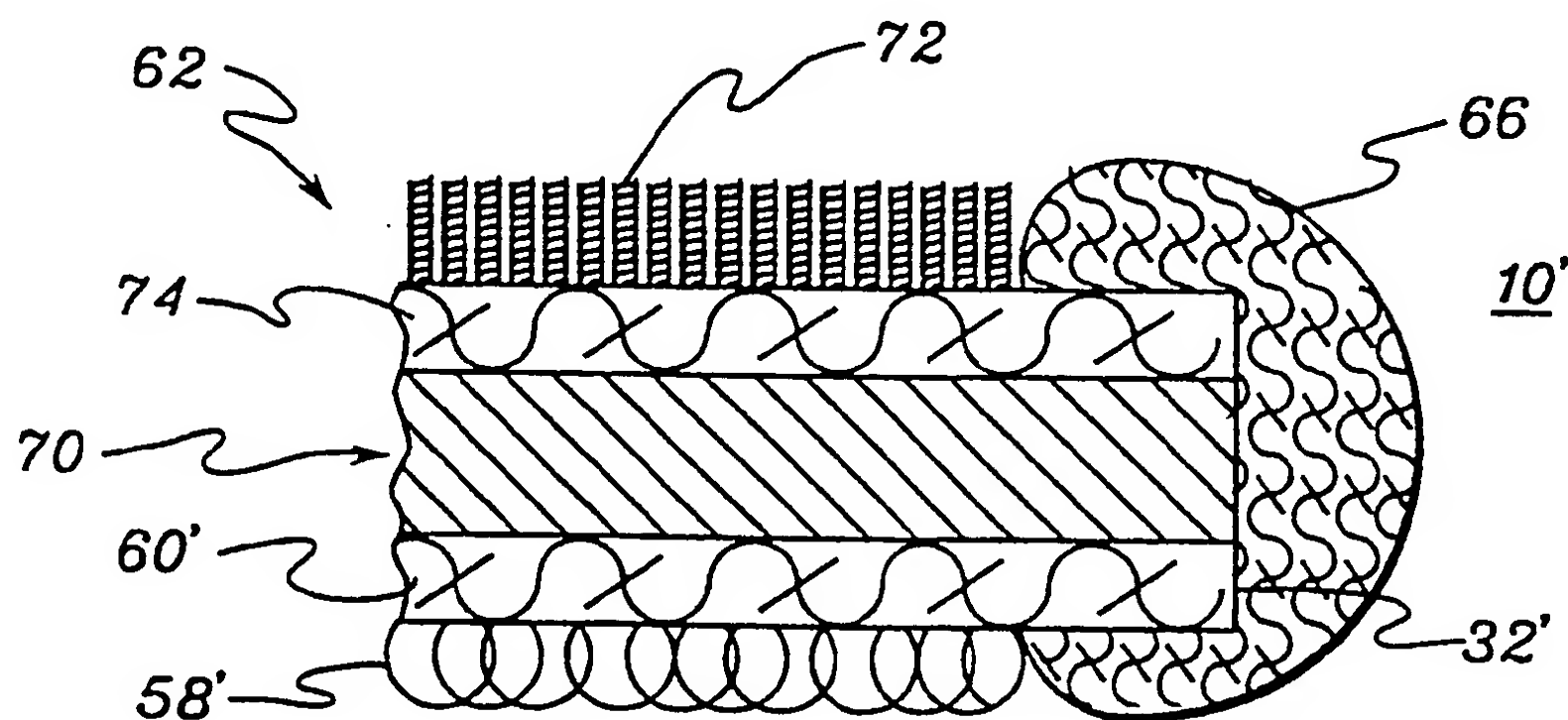


fig. 7

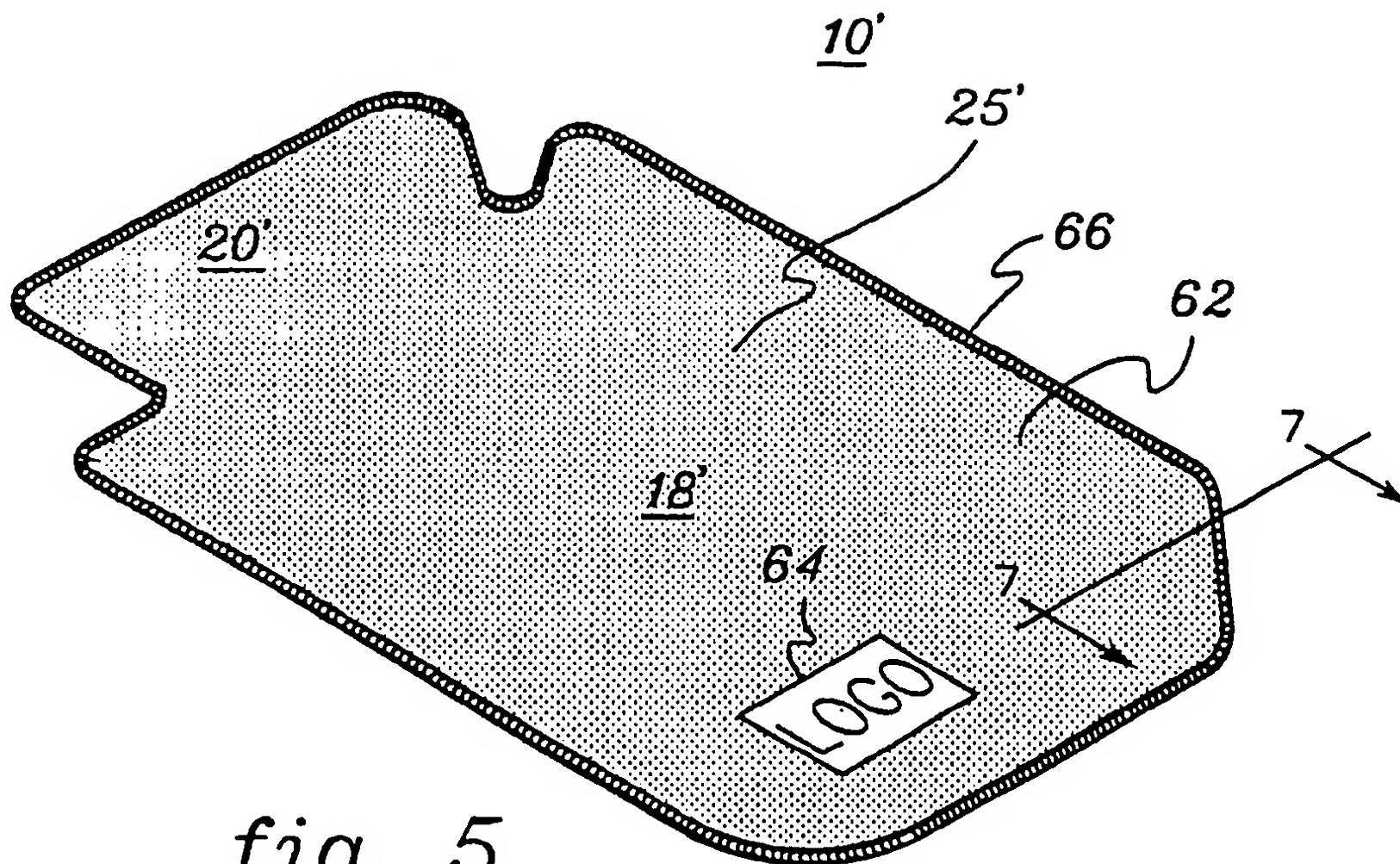


fig. 5

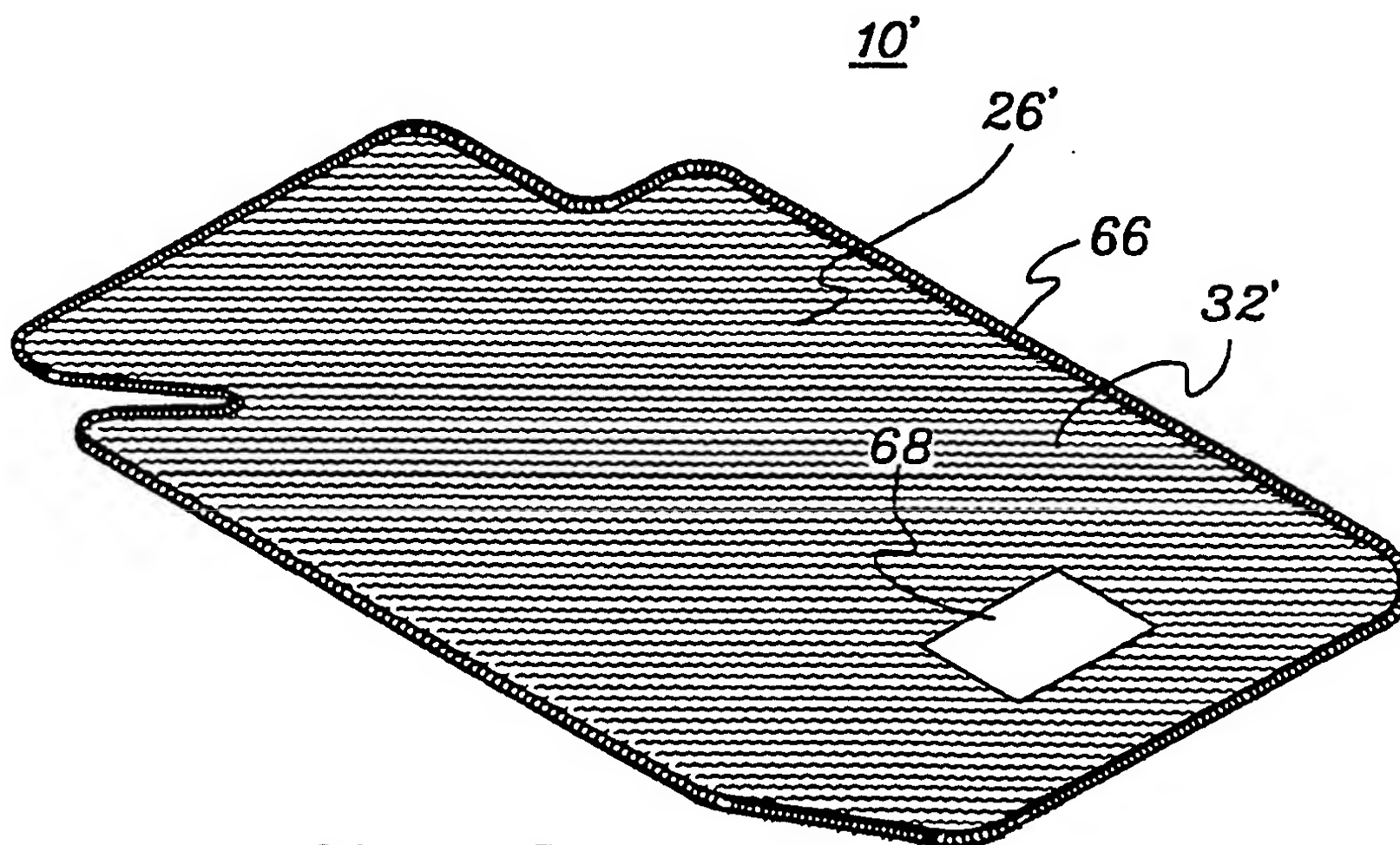


fig. 6

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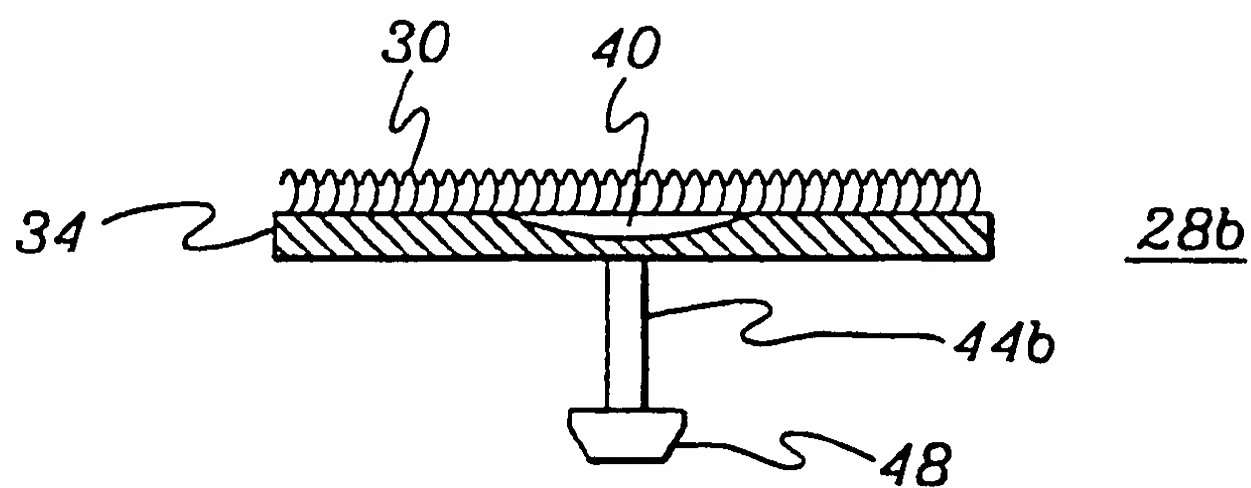


fig. 8A

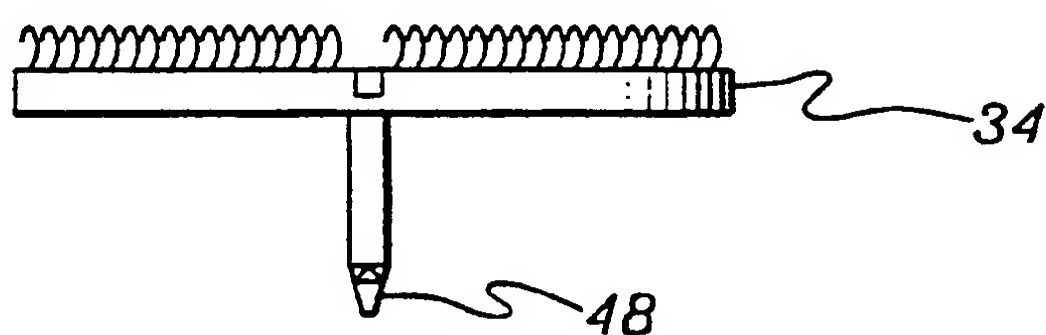


fig. 8B

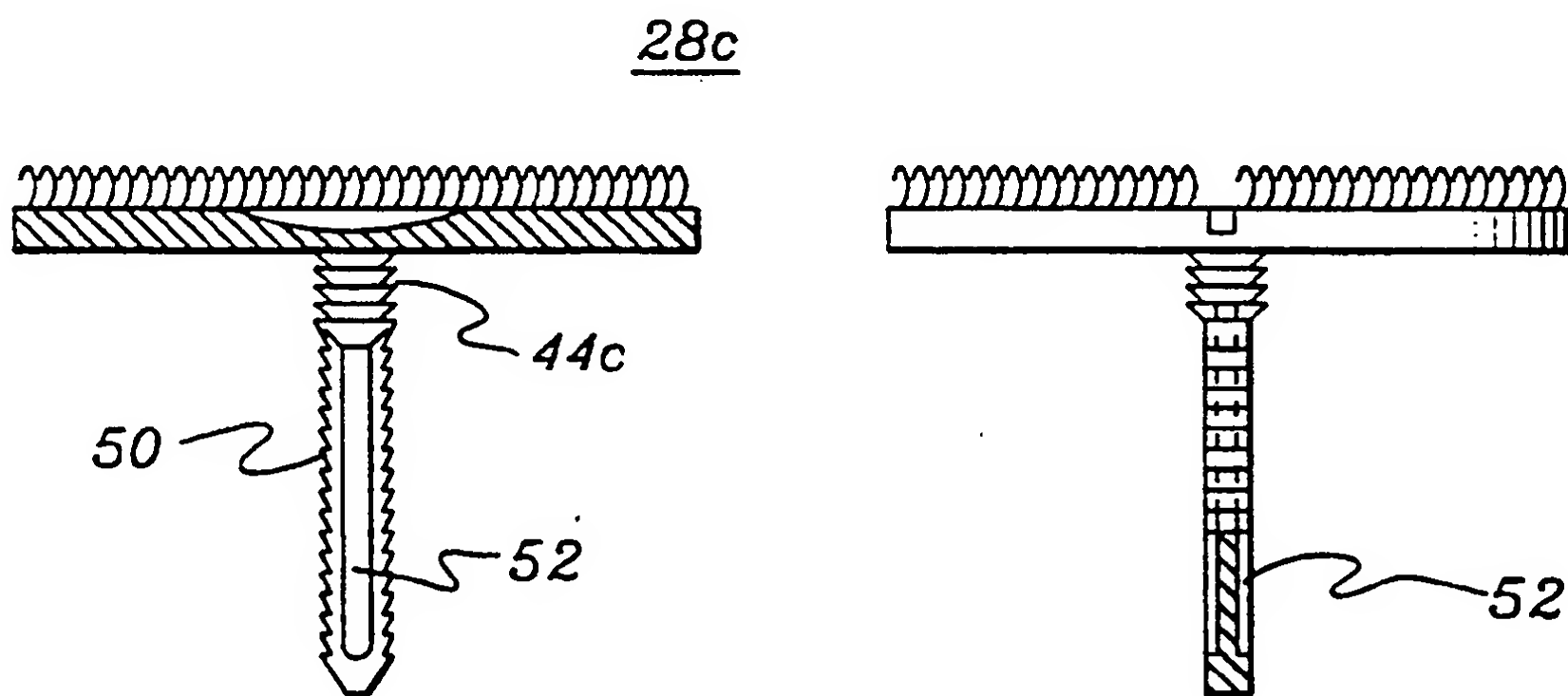


fig. 9A

fig. 9B

INTERNATIONAL SEARCH REPORT

Inter. onal Application No
PCT/US 96/12893

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B60N3/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B60N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,C,42 18 213 (BAYERISCHE MOTOREN WERKE AG) 10 February 1994 see column 2, line 19 - line 23	1,2,26, 27,33,34
Y	see column 3, line 3 - line 14; figure 1 ---	30,32
Y	DE,A,42 04 410 (FISCHER ARTUR WERKE GMBH) 19 August 1993	30,32
A	see column 2, line 47 - line 53; figure 12 ---	27
X	US,A,4 968 548 (GIBSON WILLIAM E ET AL) 6 November 1990 see column 4, line 4 - line 12; figure 5 ---	20
A	DE,U,93 02 659 (RAYMOND GMBH & CO KG A) 23 June 1994 ---	
A	US,A,4 998 319 (FORD CHRISTOPHER) 12 March 1991 -----	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

5 December 1996

Date of mailing of the international search report

18.12.96

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 96/12893

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		DE-D- 59206953	26-09-96
		EP-A- 0561055	22-09-93
		JP-A- 5278511	26-10-93
		JP-B- 6086196	02-11-94
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US-A-4968548	06-11-90	NONE	
DE-U-9302659	23-06-94	EP-A- 0612492	31-08-94
US-A-4998319	12-03-91	NONE	